

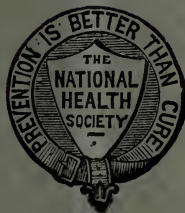
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# UNSEEN DANGERS IN THE HOME.

A Lecture.

BY  
MRS. PRIESTLEY.

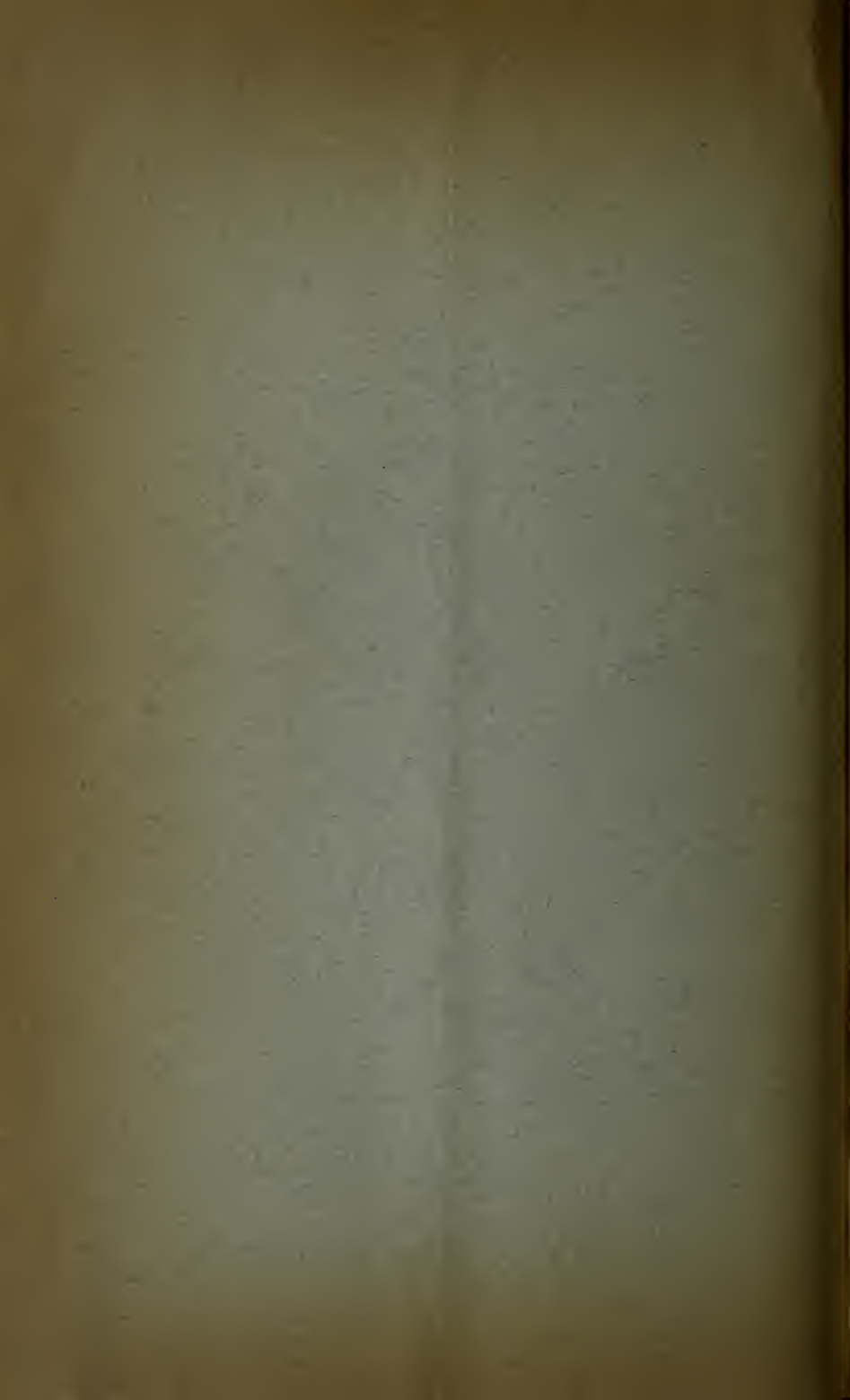
READ BY MISS BARNETT, AT THE PARKES MUSEUM,  
JANUARY 22ND, 1885.



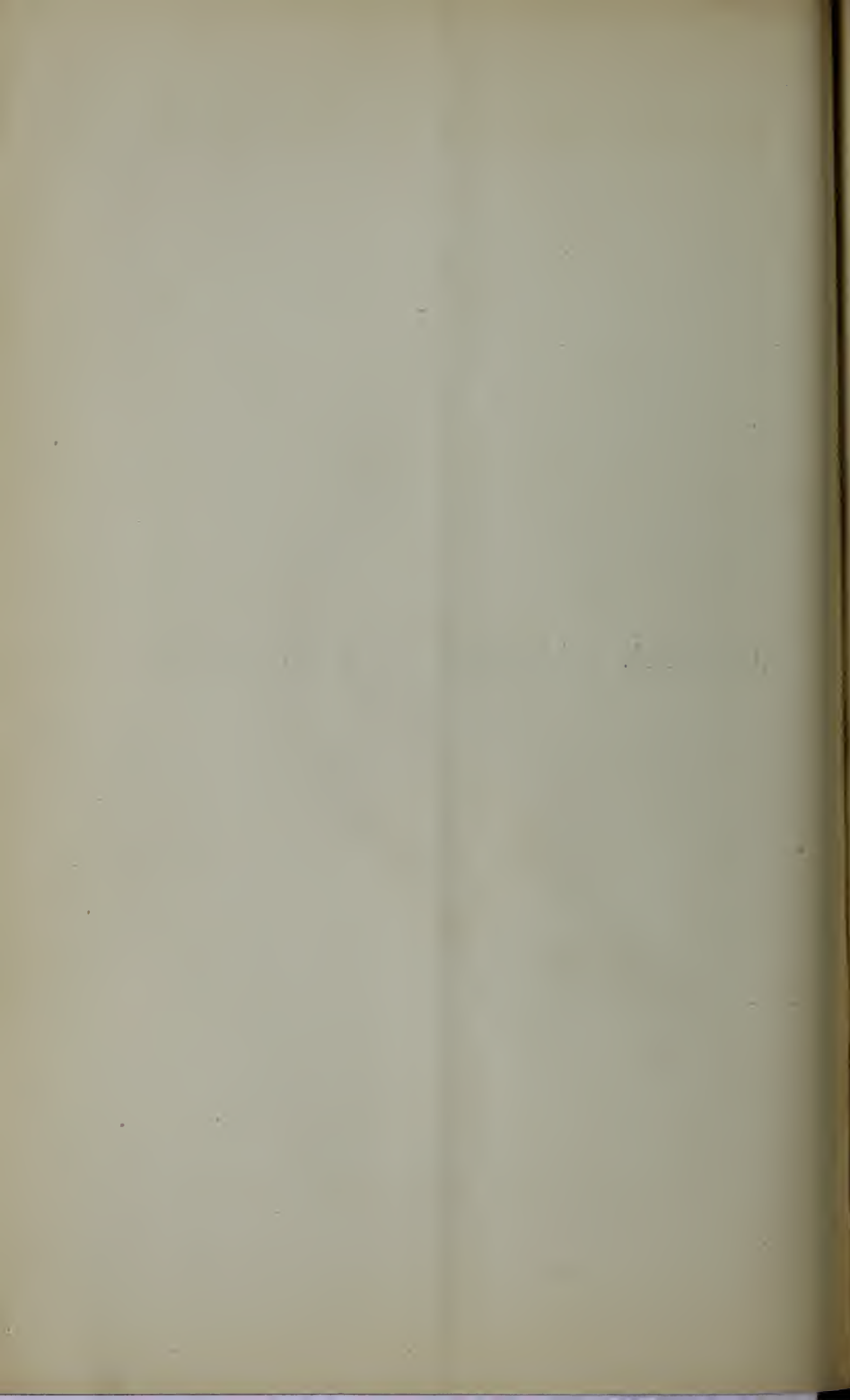
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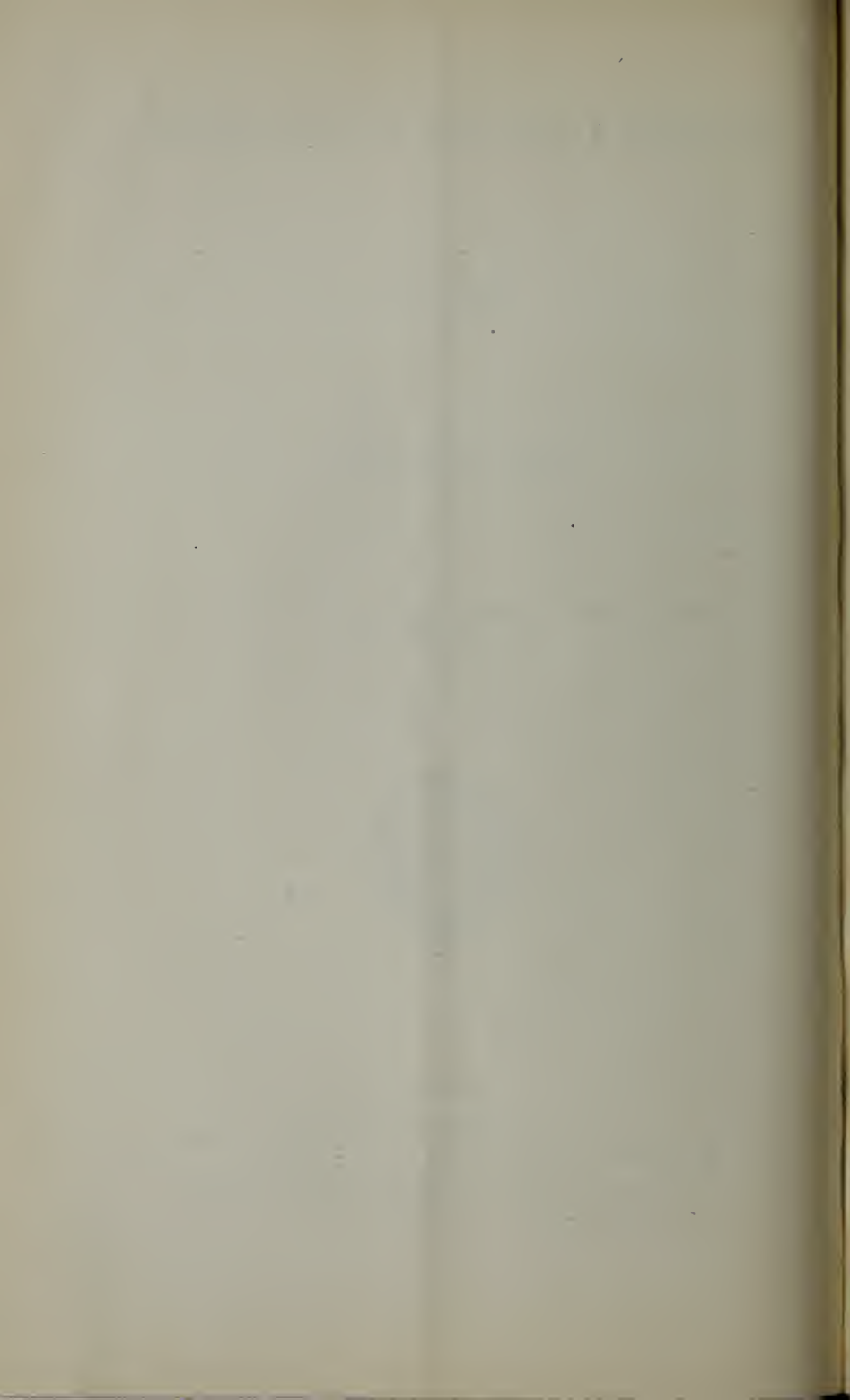
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## UNSEEN DANGERS IN THE HOME.

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LADIES,

I have been asked by the National Health Society to speak to you to-day about matters concerning the home in its relation to health. It is a subject which concerns every householder, and is one which ought to occupy as much of the attention of the mistress as does the kitchen, for the obvious reason that a house will not keep itself in the sanitary condition in which it ought to be kept without some guiding intelligence to direct its affairs. It is not enough to go downstairs every morning to survey the larder with thoughts bent only on the dinner; but it is essential that you should know something of the condition of that larder and its surroundings before you can expect the meat to keep fresh, and it is also further necessary that you should attend to the state of your basement generally before you can hope to show a clean bill of health. In trying to impress these duties upon you, I am cheered by the thought that the more personal trouble taken, the greater will be the hygienic reward.

We shall begin, then, with the dangerous things which are unseen, and the importance of bringing them to light. First, the air we breathe is invisible, but when made visible by a ray of sun penetrating darkness, it is found to be clouded with minute particles. Now all of these particles, or motes, are vehicles for living germs still more invisible, yet with the power of making their presence



apparent in every form of decomposition. All animal and vegetable refuse heaped up and left to fester enters into this state of decomposition, and its proximity to the dwelling cannot exist without a deteriorating influence on health. We know from experience that the seeds of disease, although unseen, are not only carried by the motes of the air, but are readily conveyed by water into the human body, and by contact with those already infected—a contingency unavoidable in an immense population ever passing to and fro. In common with other seeds, they will not germinate on barren ground, but, given a favourable soil, they spring into activity, and become rapidly reproductive.

Scientific men are at present devoting much attention to the artificial cultivation of the germs of disease, with a view to ascertaining their origin and history. They find that not only does milk make an excellent medium for the propagation and conveyance of typhoid and other ferment fevers, but that potato, mutton-broth, gelatine, and other substances of a domestic nature make fertile breeding-grounds for the germs of disease; which facts are worth some consideration when making arrangements for the disposal of our kitchen refuse. Indeed, all animal and vegetable matter makes a readily fertile soil when exposed to decay, or in other words to the attacks of bacteria, which cause decay; for you may feel sure of this—whenever you see or smell putrefaction, it means that the great unseen world of destructive organisms is at work on its vast mission, a mission full of capacity for good and for evil. For destructive energy, these invisible agents surpass all the wild beasts of the forest ever known in pre-historic times, and all the most powerful weapons of war ever invented in these our own civilized days for the destruction of human life *en masse*. Again, the necessary soil may be found in our own bodies, through the deterioration of the blood by over-indulgence in eating or drinking, or through breathing year by year the poisoned night air within our homes. Hence a clean



house, with clean surroundings and sound sanitary conditions, is one of the best guarantees for a clean constitution, and therefore one of the most effectual barriers against the inroads and subsequent cultivation of disease.

Our first duty, then, is to see that the air round about the house is pure; for it has to enter through the open windows and doors by day, and through all manner of unsuspected crevices by night, and is the air which has to feed our lungs, to purify our blood, and on which we are dependent for life itself. Our object must be to clean the air if foul, but better still to prevent its contamination by the exercise of unceasing vigilance and care.

With these facts before us, it is terrible to reflect that almost every house, whether in town or country, keeps its own plague-spot in the familiar shape of midden or dust-bin at the door. With cholera possibly advancing upon us, we cannot be too careful to stave off the unwelcome visitor by keeping our homes clean. You may possibly think that this warning applies only to crowded back slums; but it applies equally, and by the same unfailing laws, to the proudest mansions of the Metropolis, if certain elementary conditions of cleanliness are neglected: thus the filthy state of the underground cellars, and the defective state of the drains, brings down the lord's dwelling to the disease-producing level of the poorest rag-picker's den. All filth fevers have a subtle way of extending their feelers out and beyond the dark and dingy centres where they originate, to strike where least expected. Hence the prince in his palace and the poor starved outcast succumb to the same disease, for the simple reason that these invisible germs show no mercy, and multiply as readily in the tissue and blood of the one as of the other, till the strength is consumed and life ends.

In summer the fashionable streets are often as offensive as any back-slums could be, from the horrible odours which arise from the areas below. In the houses of the rich there is an immense deal of waste, but if this is un-

avoidable, there is no reason why such waste should be converted into poison, to taint the air and breed disease, if care and foresight can prevent it. I asked a neighbour one day if she had ever seen her own dust-cellar. She drew herself up in horror, exclaiming, 'Certainly not; she always tried not to think of unpleasant things.' Now there is no reason why a dust-cellar should be unpleasant, either to see or to think of; but if the mistress does not deem it right to think of such things, no one else will, unless, on engaging a servant, it is made his or her appointed duty to inspect the cellars and see that they are kept clean. In reforming your dust-cellar, it will be necessary to make deliberate arrangements for the dust and refuse of your house. First of all, you must do away with the pestiferous fixed stone receptacle usually found in London cellars, or in some cases wooden receptacles attached to the wall of the house. It is impossible to clean such things, even if any one could be found to undertake the work. The consequence is, that they stand hidden in the dark, or in the area receiving the daily refuse year after year, the ground underneath and around being sodden with the filth of ages. The tardy visit of the dust-cart converts the area, steps, and pavement into a very plague-spot, over which the gay world may be tripping before long to partake of viands brought up from the proximity of these very regions below.

It will be necessary, in doing away with the fixed dust-bin, to have all the bad soil removed, and fresh soil or flooring laid down. The whole cellar must be disinfected and whitewashed, and light and air let in. Here is a model of a plan which is beginning to be adopted, and which I find works admirably at home. Two iron bars are fixed across the cellar. A row of sacks—not too large to be easily carried up narrow steps—hang thereon to receive the dry dust, and are ready for the dustman to shoulder when he calls with his cart at the door.

For all moist kitchen refuse two covered pails are

provided, the one being taken full, and the other returned empty every day. There is no difficulty about this, for every cook enjoys the daily attendance of the pigs'-meat man, who keeps a flourishing colony of pigs outside London, and sends a cart and pair into town every morning for the food. These pails do not stand inside the cellar, but outside, exposed to the wind and rain. By the adoption of this contrivance we are saved the scattering of the dirt and *débris* about our door when the dustman calls, for all he has to do is to empty the sacks into his cart, and hang them up again on the rods. This I find a very simple remedy for an otherwise unavoidable and very grave domestic nuisance.

In the country house it is equally necessary to arrange for house refuse, and this can also become systematized by a little forethought. The best plan is to have a covered wheelbarrow at the back door, which can be wheeled off and emptied every day by the gardener, who ought to use it for manure. Where there are pigs and poultry there need be no waste, but it is necessary to establish a pail for the one and a pail for the other.

With regard to the other cellars of a London house, it is well to give some attention to them, for no words can describe the horrors of these dark neglected corners, especially in houses where men-servants are kept. They require regular inspection, and all that a mistress can do is to make it the special duty of some one to attend to them, and to see that this duty is faithfully performed.

Again, all coal-cellars ought to be ventilated, else the coal diminishes in volume, owing to the chemical effect of the gases which accumulate, and which are apt to be wafted back into the house, bringing unwelcome if not noxious odours.

In damp basements it is a great mistake to have too much wet scrubbing. Dry cleaning is better and less likely to cause dry rot and mould.

The next point to be considered is the ground on which



the house is built, and the emanations which may arise therefrom. First, I must call attention to the frequent discovery of stagnant disused cesspools under the basements of old houses. If people did but reflect that our present system of drainage is comparatively modern, they would know that of necessity it has become engrafted on to the old system, the decomposing relics of which are in all probability still there. It is, therefore, most essential to have the cellars or basement well searched in all houses built anterior to our present plan of drainage, which of all plans is the best for towns, if complete in every detail; but is at the same time the most dangerous if defective. Unfortunately, it is apt to be defective, because the pipes being so carefully laid out of sight, are therefore out of mind, besides being more or less out of reach.

In addition to old cesspools, other sources of danger may be discovered on careful examination. Not long ago some men working at the foundations of a house in Mayfair broke in upon a pit containing the putrifying carcasses of nine cows, which bore the mark of the pole-axe on their skulls, suggestive of sacrifice during some murrain, when that part of the town was a farm. So foul was this burial-place when opened that the workmen fled in a body from the ground. Nevertheless, unthinking people had been content to dwell in this house for more than a century, carrying on the business and pleasure of life unconscious of the plague-spot underneath.

Within a few yards of the same locality, while clearing the ground for new stables, further remains of cattle and horses were found, and at the same time many loads of night-soil were removed, which had escaped from the leaking drains of the desirable mansions round about. When such discoveries are made it is nobody's business to tell the inhabitants that their drains are defective, so that things go on just as they were—the old houses poisoning the newly built which rise in their midst, until the warning comes, and we realize in our houses the subject so ex-

quisitely painted by Watts, of Love vainly struggling to keep back Death from the door.

There is no exaggeration about all this. The points I have mentioned and have still to call attention to are undoubted sources of bad health. I do not say that all the defects I beg to call attention to exist in every house, but I do say that few houses are without one or other, possibly many, of these dangers, the removal of which would bring to the inmates an improved standard of health. Professor de Chaumont, in a lecture given at the Health Exhibition, dwelt on the fact that we have diseases among us that are continually killing people day by day, which in the long run are far more destructive than cholera. In 1866, when cholera killed 18,000 people in England, the deaths from enteric fever during the same year were 21,000. So that, to quote the words of the professor, although we are apt to run into a panic when cholera is mentioned, we sit unfortunately rather too quietly down every day amid dangers which are far more constant and even much more real.

In new houses a serious danger arises from what are called *made soils*. Some of the best work done by the National Health Society has been in calling the attention of the sanitary authorities to flagrant cases of house-building on the top of made soil in a state of putrescence.

A few years ago Dr. Parkes and Dr. Burdon Sanderson, in a report on the town of Liverpool, gave a graphic account of the strange mixture of stuffs that they found in the *made soils* of that town. Every kind of animal and vegetable matter may be found in these made soils—all going through a process of decomposition. Unfortunately, when a fine sandy soil is found in the foundations, the builders are tempted to sell it for a high price, and use, as a substitute, the made soil with all its possibilities for evil. No new house built on the top of made soil is safe to live in until two years at least have passed, when the decaying matter will have become innocuous. Only the

other day I surprised a young friend by inquiring tenderly after her children. She asked how I knew they had been ill? I replied I did not know it—I only took it for granted on hearing she had gone into a new house, in a new neighbourhood, where the upturned ground revealed the nature of the soil. The result was an outbreak of diphtheria, a very common result, and one which brings no surprise to those who understand the simple rudiments of health.

Dr. de Chaumont, in his manual 'The Habitation in its Relation to Health,' says: 'The dangers to health from a bad site are due, so far as the house itself is concerned, to the fact that damp and unhealthy vapours (or *emanations*, as they are called) rise into the house itself. There would be a danger of this even if the air within the house were always of the same temperature as the air outside, but when we remember that in almost every instance the air inside the house is *warmer* than the air outside, the danger becomes clearly greater. When air is heated it rises, so that the upper part of a room is always hotter than the lower; this is caused by the colder and heavier air falling down and pushing up the warmer and lighter air. Now, the consequence of such an up-current is that it draws other air behind it from some part or another, just in the same way as a pump does water. Now, if the floor of the house be air-tight, the heated air, in passing up to escape at the chimney or other opening, will draw air from openings to the outside, such as a window or a ventilator. But if the floor be not air-tight and the windows be shut, and there be no ventilation, then, as air must be got from somewhere, it will be drawn through the floors from the soil on which the house stands. So that every house tends to act as a suction-pump and draw air out of the ground. Now, this ground-air is very impure, and its impurity, although a good thing for plants, is a very bad thing for men and animals—therefore we ought to prevent it getting into our houses. When it passes up into the open air it is

soon mixed with large quantities of fresh air, and its bad effects to a great extent prevented; but when it passes into our houses, where the air itself is often impure enough from other causes, it comes in a much more concentrated form, and cannot be diluted so as to be rendered harmless. In most instances, however, little or no precaution is taken to prevent this: houses in towns are built on *made soil*, and cottages in the country are planted on the bare ground. The least evil that results is more or less constant damp, not to speak of the more actively dangerous emanations that often arise.' Foundations, then, of concrete are desirable, but where that cannot be had, a layer of well puddled clay, we are told by the same eminent authority, would be the next best thing.

Another point to be considered is the level of the ground as regards the nearest river. In many districts of London, fashionable and otherwise, the cellars and basements are below the level of the river, and this can never be good. Dr. de Chaumont points out the danger arising from damp due to *ground-water*. Many of you, no doubt, have never heard of ground-water before, but in taking a house it is essential to be aware of this, and to find out how far the ground-water lies from the surface. This water, we are told, is 'the great underground lake or sea which exists everywhere at different depths from the ordinary level of the ground, which supplies the water found in wells, and which is the great danger and cause of floods in coal and other mines. In almost any place, if we dig deep enough, we come to water; but in some places we come sooner upon it than in others. The ground-water is, therefore, said to be higher or lower in one place than another. Its height can easily be measured by finding how deep down it is to the surface of any shallow well in the neighbourhood. In some places it is found a foot or two from the surface; in others not until we go down fifteen feet or more. It varies with the amount of rainfall, being higher some time after heavy rain than after



dry weather. It is plain that if the water is too near the ground-level the place will be damp, therefore a low ground-water level is to be wished for.'

The modern sanitary engineer has much difficulty in contending with this unsuspected source of danger, not only in the country, but in many of the finest houses in London. I know of a case in Kensington where the neighbours on either side were unconsciously indebted to the tenant living between them for the improved state of their ground-floor. The place had been drained, not without difficulty, and I need scarcely say, not until *after* sickness had broken out, and called attention to the unwelcome fact of this hidden and unsuspected source of danger. The best security lies in being forewarned of such dangers, and to institute inquiries concerning them *before*, instead of *after*, entering upon possession of a house.

It is due to a knowledge of this particular danger that physicians have sometimes found it necessary to remove their patients from a low-lying district to a higher one in the same town, before convalescence would set in.

A friend told me one day that he had been obliged to leave his house in Mayfair, owing to the condition of the basement causing so much sickness among the servants. Experts, who had been called in to see about the drains, discovered a large well, full of water, extending from under the pantry into the back area. The water was found to be contaminated with sewage from defective drains round about; so all they could do was to cover up the place again, and leave the house just as it was for the next tenant, lured into it, no doubt, by the outward and visible signs of an extremely desirable residence. Soon after this, another friend, living in the same neighbourhood, but nearer Piccadilly, told me of a similar experience. On mentioning the other instance, we were able to trace both to the same source. It was that which in all probability supplied a reservoir formerly known to

exist in St. James's Park. These were two very good examples of the troubles arising from unsuspected water under ground. It will, therefore, be seen that in choosing a house it is advisable to have some regard to the elevation of the ground. If the street be higher at one end than the other, let your choice fall, if possible, on the higher end. If not limited to a particular locality, choose the more elevated. For instance, Mayfair is higher than Westminster and Belgravia, which, not many years ago, were mere swamps. Tyburnia, on the north side of Hyde Park, is better than Mayfair, and Hampstead better still.

In country places you frequently see cottages grouped in hollows for the sake of shelter, or against a bank, down which the rain pours into the back-rooms, or under the floors of the miserable little dwellings. You will generally find that some of the inhabitants have been bed-ridden for years, while others go about so distorted with rheumatism that you can scarcely recognise the original human form. Last year I entered such a dwelling, planted on the moors in a lonely part of Scotland, and found therein a man dying of cancer, in a wretched room, surrounded by his family. I asked the wife if she had no other room in which the sick man could be decently screened from his children, on whom the sight of his sufferings must have a depressing and painful effect. She thereupon took me into the other room of the cottage to show me how unavailable it was. It was like entering a tomb. The walls were dripping with stale damp, and the roof, acting as a sucker, drew unwholesome vapours from the ground. This, then, was the room formerly occupied by the man and his wife, until the last stage of his sickness laid him up by day as well as by night, and he clung to the warmth of the one fire. Into this small room the whole family was crowded save one, the eldest girl, on whom the sufferings of her father had told with such effect, that she had lost her reason and been sent away.

When sickness comes, these poor ignorant people accept

it humbly as the will of the Almighty, knowing nothing whatever of the laws by which they might be saved.

Last March I came upon another example of ignorance with regard to the choice of a site, but this time it was not in the crofter's dwelling, but in the home of the Vestal Virgins in Ancient Rome. Nothing could have been worse chosen than the site of this sacred building, which was placed immediately under the palace of the Cæsars, with the back walls flush against the Palatine Hill. There were no back windows, therefore no ventilation right through—a serious defect in the Roman or any other climate. Exactly as in the case of the crofter's hut, the damp came coursing down from the higher ground, and, saturating the walls, settled in the ground underneath. Unlike the crofters, however, the Vestal Virgins had not accepted this condition of things as by the special will of the gods; but had made valiant efforts to overcome the difficulty by every device they could think of—the traces of which I saw. In the back chambers they had built one wall in front of another, leaving a space between; and at the bottom was an ingenious but ineffectual little drain, meant to carry away the water. In one room were the remains of three different walls, all exquisitely painted, lovely to the eye; but that ever-encroaching damp has been as fatal to art as to health. Where the floor had been taken up, we came on further evidences of the struggle; but here the plan adopted was more to the purpose; for laid underneath were rows of earthenware vases, which had been cut in two, and placed inverted on the ground to absorb the wet. Many persons have taken these vases for oil cruses, but I was assured by an eminent authority on Roman antiquities that they were distinctly used for the purpose named; and that there was historical evidence to show that the Vestal Virgins, far from enjoying divine immunity from sickness, had, in common with the rest of the human race, occasionally to send for the doctor.



In choosing a house, most people are influenced by the convenience of the situation in reference to the work to be done. Professional men must live in the heart of their business, Vestal Virgins in bygone times had to live near their temple, members of Parliament and others coming to town for the season must be in a so-called good neighbourhood, while military people who go from place to place must be thankful for what they can get. But, whether for a permanent residence or for a temporary one, the first thing thought of is the convenience of the situation. This being of necessity paramount to everything else, the question of health gets overlooked, and always will be overlooked, until it becomes the woman's side of the question. To the wife is entrusted the management of the house and the care of the family; but, unless she knows something of the laws which govern health, she is likely to pass the best years of her life in a fruitless struggle against sickness which might be avoided. Every wife and mother, then, ought to go to the root of the matter and study house-sanitation, so that she may be able to protect from danger those who are dependent on her for their welfare.

It is not easy to find a house at once convenient and healthy. The only house in London which has been built absolutely right, from the beginning, has never had a tenant; and is so extremely inconvenient that it is doomed by the owners, who can no longer allow it to stand even as a model, which was the original meaning of its existence. I allude to the sanitary and insanitary houses at the late Health Exhibition, the demolition of which all must regret who take any interest in the sanitary education of the people.

One great lesson to be learnt from them was very consoling—namely, the possibility of making an *insanitary* into a sanitary dwelling. In most towns this is quite possible by employing the services of a sanitary engineer or architect, who makes the healthiness of the home a

speciality of his profession. Still, there are many parts of the globe where it is not possible to command such services, therefore it is as well for all intelligent human beings to carry a reserve fund of practical knowledge within themselves to draw upon when necessary.

The expense of sanitary improvements is often urged as an excuse for leaving things alone. This is a great mistake, and sure to end in having to pay double the sum to the doctor. Again, there are others who pay the money and fail to get things right, from trusting to the plumber without the intervention of an expert. An instance of this happened to a friend of mine, who took a house in Mayfair four and twenty years ago, before the days of the domestic sanitary engineer. He was satisfied with the convenience of the situation, and his wife with the prettiness of the house. Being a physician, however, he was alive to the perils unseen, and would not enter into possession until the drains had been thoroughly overhauled and put in order. The contract with a large firm for doing this amounted to £100.

In due time the family moved into the new house, and all seemed to be going well till the physician himself fell ill with diphtheria, which he had contracted from a patient in the ordinary course of duty. Here, then, was danger brought into the house, and danger of a kind that would test the fitness of the house to bear the strain of disease. To avoid unnecessary risk, the children and most of the servants were sent away; which proved a wise precaution as things turned out. The invalid occupied a room which had been one of the chief attractions to the wife in taking the house, but which now became to her a source of unspeakable sorrow. In order to neutralize the noise of the street, the previous tenant had furnished this room (which was *en suite* with the drawing-room) in the most luxurious fashion. The walls were covered with blue woollen damask, thickly padded and quilted with gilt buttons. It was part of the bargain that all this furniture should be taken

over with the house. The effect was altogether so rich, so warm, so beautiful, and the result so noiseless and so comfortable, that the wife had successfully pleaded for its remaining, despite the remonstrances of the husband, who had viewed it with a practical and therefore disapproving eye. The very circumstances which he dreaded had now come to pass, and he himself was the victim of a disease peculiarly dependent on sanitary surroundings for recovery. Many doctors came to see him, and as they looked at the soft luxurious walls, and at the adjoining bath-room with every modern convenience, they groaned. In the padded chamber, where the fever ran high, the quilted walls imbibed the poison, and gave it out again, thus rendering the atmosphere ever more and more deadly. Every hour the danger increased, and, when life was almost despaired of, a final effort was made, and the invalid was wheeled into the next room, which, divested of unnecessary furniture, and with clean unabsorbent walls, was as free from danger and as destitute of beauty as the bare hospital ward.

Gradually from that hour the fever abated, and recovery set in. Convalescence, however, was slow; for the blood was so saturated and poisoned with disease that paralysis supervened, and complete power only came back at the end of a very long year.

During his absence the house was once more handed over to a contractor, who found everything wrong, and undertook to put everything right for a further outlay of £80. The disease-laden walls of the sick-room were stripped, and the rich blue quilted stuff had to give way to a light French-grey paper, varnished, very commonplace, but very sanitary. One would imagine that all had now been done that could be done to make a house healthy; but in those days house sanitation was not understood, and it was only some years later that a state of perfection was finally reached.

The last improvements were due to a lecture given by



Mr. (now Sir Robert) Rawlinson, on 'Domestic Sanitation,' to the National Health Society. The physician's wife, still sorrowing from her recent experience, happened to see the lecture advertised, and resolved to attend. Every word of that lecture struck home. Her eyes were opened, her senses were awakened, and she determined that henceforth ignorance should no longer hold sway where knowledge could save from sickness and suffering those whom she held most dear.

She had no idea of simply listening to a lecture and then letting the matter drop, but, seeking an introduction to the lecturer, she prevailed upon him to come next day on a visit of inspection to her house. As a personal friend of her husband's he had no hesitation in complying with her urgent desire. This diagram, No. 1, gives a fair idea of what he found wrong. In the first place, you will see that the overflow pipes of the cisterns go directly into the soil pipe, thus contaminating the drinking-water. Now, if you observe matters closely, you will see how easy it is for the diphtheric germs to find their way from the soil pipe on the bedroom floor to the drinking-water up above, and down below, by this straight road of communication between the two. Not only that, but everything, when there, favours their vitality; for in these pipes and in that cistern they find congenial elements—moisture, food, and the chemical agencies necessary to their activity and rapid reproduction. This shows the circle in which disease lives and moves, passing from the body of one person till it reaches the body of another, as active in the invisible stages as in the visible, when people flee from the danger.

Had the children and nursery-maids been at home during the period of this diphtheria, in all probability they would have fallen victims to the disease. Fortunately, on their return at the end of a year, they were saved from disastrous consequences by the measures taken for thorough cleansing of cisterns and drains insisted on by the physician at this extra expense of £80.



To return to the work instituted by Mr. Rawlinson.

1. The overflow pipe from the cistern was carried outside the house down to the bottom, where it stopped within a foot of a gully trap in the small back yard. The overflow pipes of bath and wash-basin in dressing-room, and sinks in housemaids' closets, were treated in the same way, and conducted outside by separate pipes. All overflow pipes were now rendered safe, for only the outer air could creep up.

2. The main drain of the house was better trapped, to prevent the return of gas from the street sewer. A ventilating tube had already been carried up to the top of the house.

3. The cellars were inspected, one being found in an extremely dangerous state from faulty drainage arrangements, and neglect on the part of the men-servants. This place was entirely reorganized, and had a new cistern with separate service supplied to it. All the cellars were ventilated, and holes were cut in the doors for air. In a word, all the bad air was carried away from the house, and only the good air was let in.

This instance gives a fair example of a London house having everything wrong, notwithstanding money freely spent, and the earnest desire on the part of the tenant to have things right. The tenant, though perfectly alive to the evils of defective drainage, had neither the time nor the technical skill necessary for personal supervision, and for all his medical knowledge had to let things go as they would. Thanks to the friendship of Mr. Rawlinson, this physician's wife was not only taught the best methods in town, but was afterwards enabled to take upon herself the sole management of very complicated sanitary arrangements in a remote part of Scotland, where her husband had taken a shooting-lodge, and where she could only obtain the services of a few men from the village to do mechanically what they were told. An account of the difficulties she encountered, and how she overcame them, has been pub-

lished in a cheap form by the National Health Society,\* of which she became a member. This diagram, No. 3, of the Highland shooting-lodge shows how the drain of the house was carried uphill with all the joints cracked and leaking. To make matters worse, the roots of a tree had blocked the way, so that there was no communication whatever with the termination.

In her isolated position there was no one to consult; but the experience which prompted her to look into this matter told her it was wrong, and could not be allowed to remain. The family and friends would all be assembling before long, and the work must be done at once. Having convinced herself of the necessity for an entirely new set of earthenware-pipes, she started off by the next train to the nearest town, and returned next morning with a couple of workmen and a truck laden with all the material required. Meanwhile some men from the nearest village were left to dig up the ground and clear away all former rubbish. She knew only too well what would happen without close supervision, and that she alone could give, being in all probability the only person in that part of the country who understood the *raison d'être* of such work, and its bearing on the healthiness of the house. The first thing to do was to alter the level, making it fall an inch to the yard instead of rising uphill. The next thing was to see that the earthenware-pipes—which were glazed inside—were joined the right way instead of the wrong, and that they were united with Roman cement, which would effectually prevent any further invasion from the roots of surrounding trees.

In choosing the pipes she made a mistake—a very common one—she got them too large. They were 6-inch pipes; now 4-inch pipes would have been better, inasmuch as they could more easily be flushed and kept clean. In selecting the pipes, however, she did one wise thing; she brought away some half-dozen having a branch upwards,

\* *Vide* 'Our Highland Home.'

that they might serve as peep-holes for the future. These were covered with gratings, and placed along the line at convenient places.

Finally, instead of allowing the men to carry the drain direct into the covered receptacle, she made them stop short of it about 3 feet, and then lay down an open gutter grooved into a bed of Roman cement, to act as an open air communication between the two things. By this intervention of fresh air, no sewer gas could by any possibility creep back into the house. With a proper water supply the pipes were kept clear, so that no traps were necessary, and if anything ever did go wrong the peep-holes would localize the spot.\* The whole of this work was completed in three days, and has served well for nine or ten years without giving further trouble. This is an engineering triumph of a primitive and natural kind within the reach of any woman who takes the trouble to think, and instead of deeming such work derogatory, regards it as a simple matter of duty.

I have now endeavoured to explain to you the insidious nature of the invisible germs which prove so destructive to life when once they find a suitable soil inside the house or inside the human body. And I have pointed out that your best protection against all zymotic or fermenting fevers is to sweep away one of the chief causes, by instituting a system of rigorous cleanliness in and round about the house, and also by living personally in accordance with the rules of health.

I have also called your attention to some of the evils which lie unseen and unsuspected under the very foundations of town houses, and the dangers of damp in badly chosen sites. We have also peeped into the sick-room and seen what comes of over luxury, and the powerlessness of money and medical knowledge alone to avert in-

\* During winter residence the open-air space at the end would require to be covered to prevent a block from snow or frost.

sanitary evils which are dependent for remedy on the technical skill and supervision of an expert.

I would ask you finally to regard your house not as a mere dead thing consisting of inanimate walls and floors. To those who understand mute languages, the tale they tell is eloquent. You must treat your house as you would treat a faithful servant. It will either be your friend or your enemy, according to the amount of consideration or neglect it receives.

Give it daily care, wash and tend it. Do not obscure the light by covering the windows with too numerous folds of lace, drawn silk blinds, and heavy curtains. You must open the windows wide and give it an air-bath every morning. Clean the air, if possible, as it enters. There are many ingenious contrivances for doing this. Be careful also to drink clean water by having your cisterns and filters properly and regularly cleansed. Never use disinfectants for pipes—they do no good, but endless mischief.

Last of all, court and welcome the sunshine. It is nature's deodorizer, nature's best medicine, and for the spirits there is no better charm.